physicists who collectively have a wealth of knowledge concerning gyroscopic action. Suppose that twenty or more of these were each to write an answer to the following question, suppose that the answers showed substantial agreement, would not their words come with great authority and lead to a thorough investigation of the subject?

The question which I propose for discussion is this:

Is it probable that the gyroscopic action of a revolving-cylinder engine produces dangerous stresses upon the framework of the flying-machine?

Practical airmen are not in agreement in this matter. Some say that the gyroscopic action is negligible, others say the contrary.

If physicists and others who have studied the gyroscope will kindly respond to this suggestion, I will see that marked copies of Science are sent to the editors of the leading aeronautical publications of the world.

James Means

Boston,
November 22, 1912

THE PEDOMETER

To the Editor of Science: In glancing over some pages of the Encyclopedia Britannica (eleventh edition) recently I found a short article on the *pedometer,* the concluding sentence of which is:

> Obviously the pedometer is little better than an ingenious toy, depending even for rough measurements on the uniformity of pace maintained throughout the journey measured.

Two definite statements are here made, both of which are quite erroneous. When properly understood and properly used the pedometer is a most useful addition to the outfit of a traveler and an especially delightful and comforting companion to those who know the joy of seeing the world *à piede.* A cheap instrument (costing only a dollar) which I have carried almost every hour of almost every day during the past dozen years is still "as good as ever," registering distances with an accuracy that is really surprising. It has been tested over hundreds of miles and kilometers of roadway in England, Germany, Italy and Switzerland (especially in the last-named country, where on most highways every kilometer of distance is marked by a stone monument), and found correct generally within one per cent., the error rarely being as much as two per cent. *I have known government surveys not so good.* Such an instrument can hardly be classed with "ingenious toys" and the explanation lies in the fact that the remainder of the sentence quoted above is equally erroneous. With the right sort of pedometer within certain considerable limits the record is *not* affected by variation in length of pace. There are two sorts of pedometers, the right sort and the wrong sort, and unfortunately it is the wrong sort that is usually offered for sale. This is simply a "step counter" the figures on the dial showing the number of steps taken and it is necessary to know the average length of step to convert this record into distance. Aside from the great inconvenience of being obliged to make a calculation whenever one desires to know the distance travelled even this instrument when properly adjusted and calibrated ought to give fairly satisfactory results. But the right sort of pedometer is not a pace counter and the numbers on the dial show directly the distance traversed in miles or, if one has the good fortune to live in a country where reason prevails over prejudice, in kilometers. In this the movement of the registering mechanism is caused by the rise and fall of a kind of horizontal pendulum, the length of the stroke for each step and hence the distance registered being capable of adjustment. But when short steps are taken the pendulum does not pass through the whole arc of its possible movement and the distance registered is consequently less. Thus, as stated above, the movement of the index hand is proportional to the distance traversed and, within certain limits, is not affected by variation in length of step. This is a most important fact and gives to this form of pedometer a value evidently not generally known or appreciated.

Ravenna, Ohio, T. C. M.
November 11, 1912